REMARKS

Claims 20-31 are pending in the application and have been examined. Claims 20-31 stand rejected. Claims 20-23 have been amended. Claims 30 and 31 have been canceled. Reconsideration and allowance of Claims 20-29 in view of the following remarks is respectfully requested.

The Rejection of Claims 20, 24, and 27 Under 35 U.S.C. §102(b) as Being Unpatentable Over Hormaza, *Sci. Horti. 79*:121-126, 1990.

Claims 20, 24, and 27 stand rejected under 35 U.S.C. §102(b) as being unpatentable over Hormaza, *Sci. Horti. 79*:121-126, 1990. The Examiner has taken the view that Hormaza teaches a method of cherry breeding comprising pollinating female flowers with a mixture of pollen from three parents, determining the phenotype of the progeny using molecular markers, determining the paternity of the progeny using RAPDS, and incorporating the selected progeny into a breeding program (citing pages 121-123, and pages 125-126).

While not acquiescing to the Examiner's position, but in order to facilitate prosecution, Claim 20, from which Claims 24 and 27 depend, has been amended and recites:

20. (Currently amended) A conifer tree breeding method comprising:

(a) mixing pollen obtained from a breeding group comprising a plurality of parental conifer trees to obtain a pollen polymix;

(b) pollinating female reproductive structures from each parental conifer tree in the plurality of conifer parental trees with the pollen polymix to obtain a plurality of progeny lots, wherein each progeny lot comprises seeds obtained from a different cross between the pollen polymix and each different conifer parental tree of the plurality of conifer parental trees;

(c) evaluating progeny conifer trees grown from each of the progeny lots using objective criteria to obtain a phenotype score;

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(d) determining the pedigree of a plurality of conifer progeny trees using DNA analysis; and

(e) using the pedigree and phenotype score to identify a plurality of elite conifer trees having an acceptable level of relatedness for inclusion in a breeding group; and

(f) using the breeding group in a next generation of tree breeding to produce an advanced generation of conifer trees having increased genetic gain.

It is submitted that Hormaza fails to teach or suggest the method of Claim 20, as amended. It is noted that Hormaza is directed to molecular marker-mediated selection of *developing embryos cultured in vitro* for use in cherry tree breeding, otherwise known as quantitative trait linkage (QTL) analysis. Hormaza does not teach or suggest methods of *conifer* tree breeding, as claimed. In addition, Hormaza fails to teach or suggest step (c) *evaluating progeny conifer trees* grown from each of the progeny lots using objective criteria to obtain a phenotype score, step (e) using the pedigree and phenotype score to identify a plurality of elite conifer trees having an acceptable level of relatedness for inclusion in a breeding group, or step (f) using the breeding group in a next generation of tree breeding to produce an advanced generation of conifer trees having increased genetic gain.

To anticipate, a reference must teach all of the elements of the claimed invention. If even one element of a claim is missing from the reference, the reference does not anticipate. As shown above, Hormaza lacks all of the steps of Claim 20, and thus does not anticipate this claim, nor Claims 24 and 27, which depend therefrom.

Moreover, Hormaza does not remotely suggest the claimed invention. As mentioned above, Hormaza describes molecular marker-mediated selection in cherry tree breeding, otherwise known as quantitative trait linkage (QTL) analysis. In particular, Hormaza describes *in vitro* embryo culture and RAPD marker-assisted selection of *in vitro* embryo cultures for

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agronomically interesting traits, to allow for "early discarding of non-interesting material *at an early stage of the breeding program*." See page 125. As described in Hormaza:

> [s]ince the number of molecular markers linked to agronomically interesting traits in fruit and nut tree species is increasing rapidly (Mehlenbacher, 1995), screening for several traits of interest can be simultaneously achieved with the use of different markers.

As further described at page 126:

> [t]he use of molecular markers at a very early developmental stage allows a reduction in the number of seedlings grown to maturity since only the seedlings with the desired traits will be transferred to pots and/or the field.

In contrast to the method of Hormaza, the present invention does not rely on linking DNA markers with one or more phenotypic traits. Rather, the present invention is directed to the use of molecular analysis to determine the pedigree of progeny conifer trees in conjunction with the *evaluation of progeny trees grown from progeny lots* using objective criteria to obtain a phenotypic score. In this regard it is noted that the Board of Patent Appeals and Interferences previously acknowledged that the present invention is distinguished from methods using quantitative trait linkage (QTL) associated with a desired trait. B.P.A.I. Decision on Appeal, Appeal No. 2006-0138, dated June 6, 2006, pages 8-9.

Moreover, it is noted that Hormaza actually teaches away from the use of phenotypic analysis of progeny trees, as required by the claimed method. For example, as stated in Hormaza "[f]ruit tree breeding is an expensive and lengthy process mainly due to the long juvenile period, the long generation times and the large size of the fruit trees (Hansche, 1983)." Hormaza at page 121.

Therefore, as shown above, Hormaza lacks all of the steps of Claim 20, and thus does not anticipate or render obvious this claim, nor Claims 24 and 27, which depend therefrom.

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Accordingly, the Examiner is respectfully requested to remove this reference as a basis for rejection of Claims 20, 24, and 27 under 35 U.S.C. § 102(b).

The Rejection of Claims 20-29 Under 35 U.S.C. § 103(a) as Being Unpatentable Over Bridgwater, "Handbook of Quantitative Forest Genetics," L. Fins et al. (eds.), 1992, pp. 69-95, in View of Hormaza.

Claims 20-29 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Bridgwater in view of Hormaza. Applicants traverse the rejection for the following reasons.

As described above, Claim 20 has been amended to incorporate the limitations of Claim 30, which has been canceled. Claims 21-23 have also been amended to recite a "conifer tree" breeding method.

Claim 20, from which Claims 21-29 depend, is believed to be allowable over Hormaza for at least the reasons described above. The teachings of Bridgwater fail to cure the deficiencies of Hormaza. Bridgwater merely provides a review of different types of mating designs used in breeding programs, including polymix breeding.

Accordingly, is submitted that the Examiner has failed to establish a *prima facie* case of obviousness because there is no suggestion or motivation to combine the references, and even if the references were to be combined, the combination fails to teach or suggest every limitation of the claimed invention, as amended. Therefore, the Examiner is respectfully requested to withdraw this combination of references as a ground of rejection of Claims 20-29 under 35 U.S.C. § 103(a).

The Rejection of Claims 20-31 Under 35 U.S.C. § 103(a) as Being Unpatentable Over Bridgwater, "Handbook of Quantitative Forest Genetics," L. Fins et al. (eds.), 1992, pp. 69-95, in View of El-Kassaby et al., *Theor. Appl. Genet. 83*(6-7):752-758, 1992, and Further in View of Stoehr et al., *Can. J. For. Res. 28*:187-195, 1998.

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Claims 20-31 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Bridgwater, "Handbook of Quantitative Forest Genetics," L. Fins et al. (eds.), 1992, pp. 69-95, in view of El-Kassaby et al., *Theor. Appl. Genet. 83*(6-7):752-758, 1992, and further in view of Stoehr et al., *Can. J. For. Res. 28*:187-195, 1998. Applicants traverse the rejection for the following reasons.

It is submitted that the Examiner has failed to establish a *prima facie* case of obviousness because there is no suggestion or motivation to combine the references, and even if the references were to be combined, the combination fails to teach or suggest every limitation of the claimed invention, as amended.

As described above, Claim 20, from which Claims 21-29 depend, has been amended to include the limitation of Claim 30. Claims 30 and 31 have been canceled. Claim 20 as amended now recites step "(e) using the pedigree and phenotype score to identify a plurality of elite conifer trees having an acceptable level of relatedness for inclusion in a breeding group; and (f) using the breeding group in a next generation of tree breeding to produce an advanced generation of conifer trees having increased genetic gain."

For the reasons set forth in detail below, applicants respectfully submit that the burden of establishing a *prima facie* case of obviousness has not been met because: (1) there is no suggestion to combine or modify the references' teachings; and (2) even if the references were to be combined, the combined teachings of the references fail to disclose every limitation of the claimed invention. As stated in the M.P.E.P. § 2143.03, to establish *prima facie* obviousness of a claimed invention, all the claim limitations must be taught or suggested by the prior art. *In re Royka*, 490 F.2d 981, 180 U.S.P.Q. 580 (C.C.P.A. 1974). "All words in a claim must be considered in judging the patentability of that claim against the prior art." Citing *In re Wilson*, 424 F.2d 1382, 1385, 165 U.S.P.Q. 494, 496 (C.C.P.A. 1970).

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Applicants respectfully submit that Bridgwater does not teach or suggest step (d) determining the pedigree of a plurality of progeny conifer trees using DNA analysis; or step (e) using the pedigree and phenotype score to identify a plurality of elite conifer trees having an acceptable level of relatedness for inclusion in a breeding group; or step (f) using the breeding group in a next generation of tree breeding to produce an advanced generation of conifer trees having increased genetic gain, as required by Claim 20, as amended. Rather, Bridgwater merely provides a review of different types of mating designs used in breeding programs, including polymix breeding.

The teachings of El-Kassaby et al. and Stoehr et al. fail to cure the deficiencies of Bridgwater. In particular it is noted that El-Kassaby et al. does not teach or suggest step (c) evaluating progeny conifer trees grown from each of the progeny lots using objective criteria to obtain a phenotypic score; step (d) determining the pedigree of a plurality of progeny conifer trees using DNA analysis; step (e) using the pedigree and phenotype score to identify a plurality of elite conifer trees having an acceptable level of relatedness for inclusion in a breeding group; or step (f) using the breeding group in a next generation of tree breeding to produce an advanced generation of conifer trees having increased genetic gain, as required by Claim 20, as amended. Rather, El-Kassaby et al. is directed to the use of *protein markers* to determine the paternity of progeny, and does not teach or suggest the use of DNA analysis, or DNA analysis in combination with a phenotypic score, to identify a plurality of elite trees for inclusion in a breeding group.

In fact, El-Kassaby et al. actually teaches away from the invention for the following reasons. El-Kassaby et al. describes a study using a polymix of three-pollen donors chosen based on multilocus allozyme genotypes giving unambiguous determination of paternity to study male reproductive success. The three males in the study showed wide variation in reproductive

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success, leading to the conclusion, in concurrence with Bridgwater, that a drawback of the polymix breeding method is lack of male pedigree control. The solution proposed by El-Kassaby et al. teaches away from the invention by suggesting the use of a polycross with a few or single males to determine general combining ability. The reference notes "due to the increased co-ancestry among offspring, using fewer males prevents concurrent testing and selecting." El-Kassaby et al. at page 758. This teaching would not lead one to an expectation of success for the use of a breeding program with concurrent pedigree testing as claimed. Therefore, applicants submit that the El-Kassaby et al. reference would not provide the required reasonable expectation of success for modifying the method of polymix breeding to include the step of concurrent pedigree analysis of progeny, nor does it teach the use of DNA analysis.

The teachings of Stoehr et al. do not cure the deficiencies of Bridgwater and El-Kassaby et al. The Examiner cites Stoehr et al. as teaching the use of DNA markers to identify pedigree in Douglas fir. However, Stoehr et al. does not teach or suggest using a pedigree and a phenotypic score to identify elite trees for use in a next generation of breeding, as required in steps (c) and (e) of Claim 20, nor does the cited reference teach or suggest using the breeding group in a next generation of tree breeding to produce an advanced generation of conifer trees having increased genetic gain, as required in step (f) of Claim 20, as amended. Rather, Stoehr et al. use a polymeric genome marker to estimate the level of outside-orchard pollen contamination, supplemental mass pollination efficacies, and natural selfing in Douglas fir.

It is submitted that there is no expectation of success for combining the teachings of these references to result in the claimed invention for at least the reasons described above. Moreover, even if these referenced teachings were to be combined, the combined teachings fail to disclose all the limitations of the claimed invention, because none of the cited references teach or suggest

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step (e) or step (f) of Claim 20, as amended. Therefore, in view of the above, it is demonstrated that the combination of Bridgwater, El-Kassaby et al., and Stoehr et al. does not render the invention of Claim 20 obvious, nor Claims 21-29, which depend from Claim 20.

Claims 20-29 are believed to be allowable over the cited references for at least the reasons described above. As further evidence of the patentability of the claimed invention, applicants previously submitted evidence of secondary considerations in the response mailed on August 4, 2006, demonstrating that there was a failure of others to provide a feasible solution to the long-standing problem of tree breeding, that the need was satisfied by the present invention, and evidence of copying of the present invention by others in the field.

In this regard, applicants disagree with the Examiner's assertion that "the Lambeth Declaration of 03 August 2006 admitted that other workers had previously combined polymix breeding and pedigree analysis in tree breeding" citing the paragraph bridging pages 4 and 5 of the Lambeth Declaration submitted in Applicant's Response filed on August 4, 2006.

Contrary to the Examiner's assertion, Applicants wish to point out that Lambeth Declaration states:

> [p]rior to the publication of our journal articles describing the PMX/WPA breeding method (Lambeth, C.C. et al., *Theor Appl. Genet. 103*:930-943 (2001)) there was a long standing need for a workable solution to the use of a polymix breeding scheme in isolation from other crossing schemes in tree breeding programs.

Lambeth Declaration, top of page 4.

It is further noted that the limitations of polymix breeding as described in the Lambeth Declaration (*e.g.*, lack of full pedigree control and inability to control inbreeding levels), led to the view in the field that "polymix breeding should only be used for estimation of breeding value and not as a basis for selection of the next generation of breeding." Lambeth Declaration, page 4. The passage of the Lambeth Declaration relied on by the Examiner refers to the McKeand

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reference, which describes a tree breeding program that evaluated progeny from a polymix crossing to estimate breeding values, *and a separate full-sib crossing* to produce a population for selecting the next generation of trees. It is noted, in contrast to the Examiner's assertion, that the McKeand study did not combine the polymix breeding system with pedigree analysis to produce elite conifer trees having an acceptable level of relatedness for inclusion in a breeding group, as claimed. Rather, two separate crossing schemes were used in the McKeand study. Therefore, applicants maintain that the evidence of secondary considerations, when properly viewed as a whole, supports the non-obviousness of the claimed invention.

Therefore, in view of the above, it is demonstrated that the combination of Bridgwater, El-Kassaby et al. and Stoehr et al. does not render Claims 20-29 obvious. Accordingly, the Examiner is respectfully requested to withdraw this combination of references as a ground for rejection of Claims 20-29 under 35 U.S.C. § 103(a).

CONCLUSION

In view of the foregoing remarks, applicants submit that all of the pending claims are in condition for allowance and notification to this effect is respectfully requested.

Respectfully submitted,

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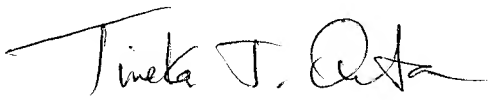

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